Telephony

...CATION | JULY 16, 1990 | INTEGRATING VOICE & DATA COMMUNI...

...ONTO
...SCENE
...ging
...ld
...ices

PAGING COMPANIES REMAIN OPTIMISTIC

But BT's folding of Metrocast casts doubts on nationwide paging

AT&T MULLS INT'L SATELLITE NET

Two new satellites would increase international circuits

MONDAY, JULY 16, 1990 Volume 219, No. 3

Telephony

INTEGRATING VOICE & DATA COMMUNICATIONS

An explosion of new products from major vendors has swept the ISDN CPE market off its feet. A whirlwind of BRI and PRI services from LECs and IXCs may soon follow. Cover photo by Troy Thomas

DEPARTMENTS

39 ADVERTISERS' INDEX

6 IN MY OPINION

40 MOVING AROUND INDUSTRY

29 NEW PRODUCTS AND SERVICES

NEWS OF THE WEEK

8 PAGING COMPANIES CARRY ON
Despite British Telecom's decision to fold its Metrocast nationwide paging operation, the industry's remaining players remain optimistic about the market

8 AT&T NULLS SATELLITE NET
Arianespace, a French satellite launching company, says AT&T is considering launching two communications satellites to increase its number of international circuits

9 SIKES SAYS FCC TO REMAIN ON COURSE
The commission will move quickly to counter the effects of a court rebuff of Computer Inquiry III rules, Chairman Sikes says

10 SATELLITE HDTV TAKES AIM AT FIBER
New technology that digitizes and compresses satellite television signals could compete with fiber in the transmission of HDTV

FEATURES

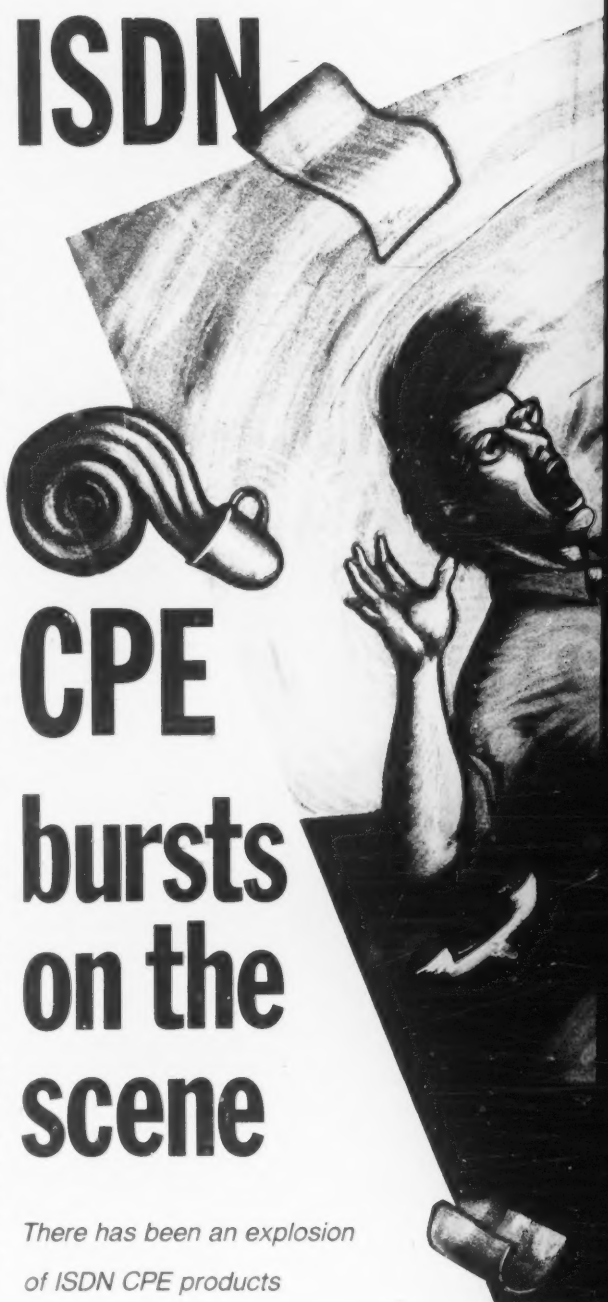
14 AN OVERLOOKED OPPORTUNITY
By Robert A. Steuernagel. High-fidelity audio could be a blockbuster ISDN application. It's just waiting to be noticed

18 ISDN CPE BURSTS ONTO THE SCENE
By William C. Kanupke. New products are sweeping the ISDN CPE market. LECs and IXCs could follow with a whirlwind of BRI and PRI bearer services

24 CAN DATA APPLICATIONS DRIVE ISDN?
By Ray Wright. Viewed as a voice service, ISDN seems both costly and unnecessary. But if ISDN were seen as a data service, its ability to deliver lower costs and better performance could win new converts

TELEPHONY (ISSN 0040-2656) is published weekly for $35.00 one year, $60.00 two years. Outside U.S. $61.00 one year, $109.00 two years. Air mail for $165.00 for U.S.; $206.00 for Canada. Air Express one year outside U.S. and Canada for $125.00. Single copies $5.00 each (payable in advance); outside U.S. add $1.00. Subscription rates apply to employees of operating telephone companies; telephone consultants; contractors; interconnect companies; specialized common carriers; military; government; associations; private communications users; schools; libraries. Published by Intertec Publishing Corp., 9221 Quivira Rd., Overland Park, KS 66215. Second class postage paid at Chicago, IL and additional mailing offices. POSTMASTER: Send address changes to TELEPHONY, P.O. Box 12960, Overland Park, KS 66212. Copyright 1990 by Telephony Division, Intertec Publishing Corp. All rights reserved. Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Telephony for libraries and other users registered with the Copyright Clearance Center provided that the fee of $1.50 per page is paid directly to CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to publisher.

ISDN CPE bursts on the scene



There has been an explosion of ISDN CPE products from major vendors this year that will affect ISDN deployment in the years to come

–WILLIAM C. KANUPKE

1990 has been a very good year so far for the ISDN customer premises equipment (CPE) industry.

The prospect of integrated services digital network basic rate interface (BRI) and primary rate interface (PRI) bearer services from both local exchange carriers and interexchange carriers has significantly increased the number of marketplace players who are designing CPE during a period of technology and market volatility. And there have been an unprecedented number of new product and feature announcements for this relatively new industry.

As Figure 1 depicts, ISDN BRI and PRI line shipments continue to increase, offering users the opportunity to evaluate and test business applications, ISDN CPE and new public network capabilities.

The ISDN CPE industry is the offspring of the marriage of telephony and digital data. The need to use network intelligence and increased feature functionality that is made available through D-channel signaling was no small part of this architectural challenge.

D-channel signaling allows new generations of intelligent CPE to make their way into the customer environment, which in turn creates new demands for increased product functionality. But it will be the death of early generation ISDN CPE that cannot accommodate user-to-user signaling-access feature sets—including a multitude of supplementary services.

During the past three years, the number of companies offering ISDN CPE has increased from 15 to more than 100. The industry can expect other firms to announce ISDN products as well as OEM alliances between manufacturers, software developers and equipment resellers. New market entrants are seeking financial backing to fund and support product development.

The ISDN CPE industry will serve as a key barometer to measure the health of the ISDN marketplace, including its major contribution—platforms for user applications. Our analysis highlights various ISDN market segments and announced offerings. It also discusses the near-term challenges that will increase the popularity of existing ISDN CPE applications and expand user acceptance of ISDN.

ISDN CPE offerings on the market today include telephones, terminal adapters, personal computer terminal adapters, ISDN PBXs, host computers, voice messaging systems, local area network (LAN) terminal adapters, ISDN multiplexers, automatic call distributors, ISDN packet assemblers/disassemblers (PADs), ISDN premises controllers, Groups III and IV facsimiles, telemetry devices, ISDN integrated voice-data workstations, ISDN test and diagnostic products, and ISDN CO emulators/simulators.

Message-oriented Signaling

Message-oriented signaling is one of the fundamental advantages of ISDN that has significantly affected traditional CPE and voice and data applications. The D channel and the signaling messages it carries are what differentiate ISDN from existing inband network signaling. The D channel provides

continued on page 20

one standard signaling mechanism for all CPE services and for all ISDN CPE.

The D channel extends network CCS/SS7 out-of-band signaling to the customer premises, thereby providing intelligent CPE that offers users faster call set-up and connection compared to existing analog call set-up procedures found in modems and

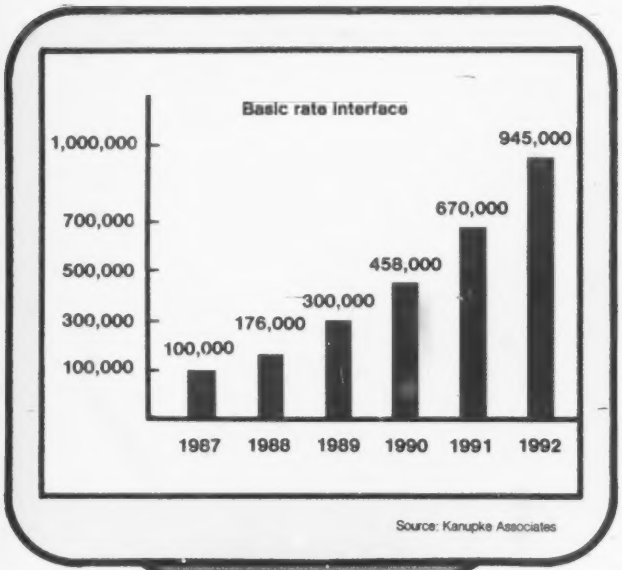


FIGURE 1
ISDN LINE SHIPMENT ESTIMATES (U.S.)

POTS phones. New CPE technology incorporates CCS/SS7 network signaling access, which is important for many of the ISDN applications that have non-circuit related signaling requirements or use extended user facilities—for example, closed user groups.

The D channel significantly enhances customer control of network services, CPE offerings and use of end-to-end signaling channels for applications independent of bearer channels, or those that use the 16-kb/s D channel without associated B channels. By taking advantage of the D-channel message sets and user-to-user information elements, customers can dynamically allocate the capacity of their access lines and select the network services they desire. This increased flexibility offers dynamic bandwidth-on-demand, bandwidth-on-reserve and permanent bandwidth of D-associated B channels, allowing network management features not available in analog modem networking products.

In some respects, terminal adapters can be considered multiservice protocol/format converters because they connect non-ISDN terminal equipment to basic rate (2B+D) or primary rate (23B+D) interface structures. Terminal adapters are available in either stand-alone versions or in-slot card designs for PCs and workstations.

The stand-alone units connect PCs, workstations, asynchronous and bisynchronous devices, SNA/SDLC terminals, facsimile units and video terminals to the ISDN network. Some of these units are data-only and can include RS232C and V.35 interfaces, both B- and D-channel support for circuit or packet switched services, rate adaption and X.25 access. Terminal adapters enable the non-destructive migration of non-ISDN desktop devices into the ISDN environment. One of the trade-offs is that terminal adapters may not be cost effective over the long term since most electronic interface cables connect to the particular device through the RS232C leads, which limits the speed to no more than 19.2 kb/s.

One of ISDN's target adaption markets is the IBM 3270 terminal population that uses coaxial terminal controllers. Terminal adapters are necessary for coaxial adaption (elimination) of IBM 3270 terminals, 3174/3274 establishment controllers and 3745 front-end processors. By using the coaxial adaption (elimination) functionality, IBM users may take advantage of the public ISDN instead of costly leased lines and modems, or wide-area Systems Network Architecture networks.

Terminal adapters can be used to connect a wide range of non-ISDN interfaces to ISDN. These include LANs, facsimile machines, host computers, private networks, protocol converters, multiplexers and industry-specific terminals such as those used in the banking and retail industries. A series of recent announcements by AT&T and Rockwell/CMC have introduced PRI connections for establishment control units and VMEbus Unix computers and workstations, thereby enabling these products to benefit from H-channel bandwidth at speeds between 384 kb/s and 1.536 Mb/s over public ISDN.

Many companies currently offer terminal adapters, including AT&T, NCR, Fujitsu, Universal Data Systems, NEC, Infotron, Harris, Racal, DGM&S, Siemens, IBM, Northern Telecom and Gandalf.

PC Terminal Adapters

Personal computer terminal adapters may be in-slot or stand-alone for the PC to adapt non-ISDN PC terminal connections to the ISDN transport. A BRI PC terminal adapter provides access to two, independent bidirectional, 64-kb/s B channels that can be used for voice, circuit-switched and packet-switched data, and one 16-kb/s channel used for signaling.

Some BRI PC terminal adapters provide voice capabilities through a standard telephone connected to a RJ11 modular phone jack built into the PC terminal adapter. This functionality enables a PC user to dial on an external 2500 set from the PC keyboard or to autodial using a directory application residing within the PC. When incoming telephone calls are received by the PC, an on-board tone ringer or visual ringing display alerts the terminal user.

PC terminal adapters that interface with IBM PCs, IBM compatibles or the recently announced Apple Macintosh use the PC as a multiservice ISDN device.

Enhanced in-slot terminal adapters using digital signal processors will have the processing capacity to allow the current generation of PC terminal adapters to store and retrieve voice messages and announcements. Vendors with a vested interest in this market include Apple, Metaplus, AT&T Network Systems, Infotron, Vadis, IBM, Teleos, NCR, ICL, AT&T-BMG, Wang, Apple, Hewlett-Packard, DGM&S, Hayes, Progressive Computing, Trillium, Siemens, Natural MicroSystems and Texas Instruments (DSP).

Although terminal adapter interfaces are limited to 19.2 kb/s, PC terminal adapters terminate and support speeds of up to 64 kb/s over a single B channel and 144 kb/s if the PC terminal adapter can terminate full 2B+D. This capacity is attractive for image and fax applications that require higher-speed devices for quality and resolution. Transition to the higher bandwidths may come much slower due to network control and signaling software that must be integrated with PC terminal adapters in a user-friendly manner.

The PC terminal adapter market emerged to funnel 64-kb/s data files to PCs. Now it is expanding to connect ISDN to LAN servers and IBM PS/2 Micro-Channel units. Recent announcements by AT&T provide PC connections to ISDN behind the PBX, thus offering ISDN functionality and supplementary service support to PCs through the ISDN-equipped PBX.

The PC terminal adapter market has rapidly expanded from a handful of players in 1988 to more than 30 participants worldwide. PC terminal adapter prices, considered by many users to be too expensive, have remained between $1200 and $1500 for the past 18 months. AT&T Network Systems' recent product announcement for a PC terminal adapter priced under $500 is expected to spur price reductions by other manufacturers for less-functional PC terminal adapters.

The chicken-and-egg opportunities still exist for the PC terminal adapter. Until PC terminal adapter vendors agree on a standardized applications software interface, significant user-sponsored applications development will still be hindered by PC terminal adapter proprietary programming interfaces offered by suppliers.

Apple's recent announcement for its non-standardized applications development kit will attract a stable of third-party Apple software developers to begin applications design. The non-standardized NETBIOS offering is similarly attracting applications development for IBM PCs and LAN networking. But users will not spend significant sums of money to decouple their application environments from de facto vendor configurations until a standard interface exists.

ISDN PBXs

In February 1989, AT&T announced the Definity PBX, which combined its System 75 and System 85 PBXs. This merged architecture also included ISDN primary rate physical interfaces for connection to carrier ISDN offerings. Siemens, Northern Telecom, NEC, Hitachi, Alcatel and others also have announced primary rate physical level interfaces.

PRIs enable the PBX to access a wide variety of public and private network services and facilities such as ISDN primary rate service access, call-by-call carrier selection, ISDN private networking services, automatic number identification delivery, multiservice bearer channels (B, H0, H1x), backup D-channel services and international ISDN PRI services.

PBX vendors with BRI behind-the-PBX connections allow data terminal access to ISDN and connection with integrated communications applications. By supporting ISDN BRIs, PBX vendors will be forced away from proprietary digital voice terminals and PBX-specific in-band signaling support. This change will allow PBX customers to use ISDN station equipment that best fits their specific application.

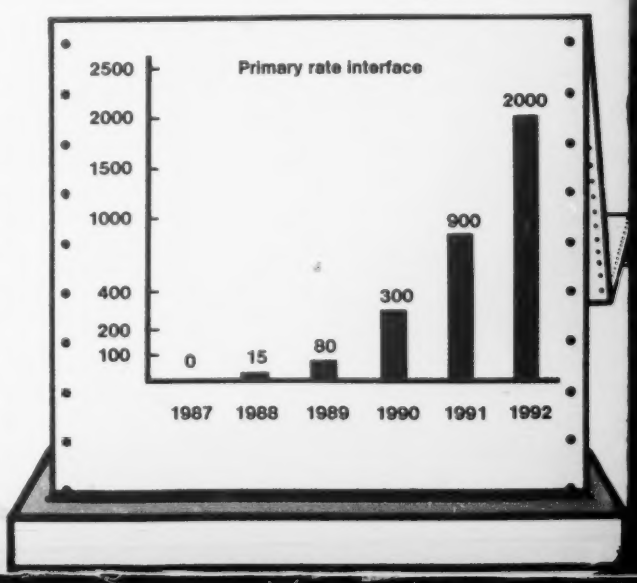
To entice users to use ISDN PBX functionality, PBX suppliers will have to focus on value-added applications offerings instead of physical connections. A PBX-attached automated call distribution (ACD) function is one example of value-added capability through the PBX for telemarketing and customer service offerings. By including additional functionality, PBX suppliers maintain customer control and achieve incremental sales revenues from ISDN terminals and software development.

LECs have begun to realize the potential revenues available by offering PBX-to-CO connection services via PRI. If the ISDN PBX can connect to the Class 5 office, the amount of bypass can be reduced and LECs can generate new service revenues. Discussions among the Bell regional holding companies indicate that Nynex, Ameritech, Pacific Bell, Bell Atlantic and Southwestern Bell will file PRI tariffs this year. AT&T, Northern Telecom, Siemens, Alcatel, NEC, Hitachi, Rolm, InteCom, SRX and Toshiba all offer ISDN PBX features.

Premises Controllers

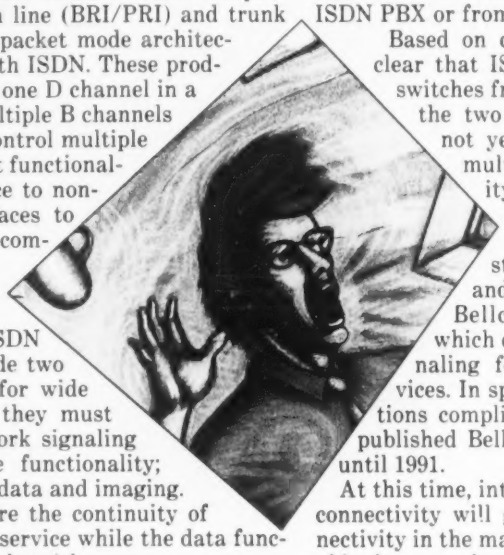
In 1983, T-1 multiplexers appeared as the basic point-to-point products that communicated between two locations over the 1.544-Mb/s facility. Since mid-

continued on page 22



1984, the T-1 multiplexer offered multitrunking, software-controlled capabilities that also included dynamic routing, bandwidth management, compression and a list of other features.

ISDN's signaling functionality requires new product capabilities that must terminate the complex ISDN protocols for both line (BRI/PRI) and trunk (BRI/PRI) support and packet mode architecture that is available with ISDN. These products must be able to use one D channel in a PRI trunk to control multiple B channels (H0, H1x) and even to control multiple PRIs. Additional product functionality includes the interface to non-ISDN PBXs and interfaces to digital PBXs and host computers.



ISDN Premises Sets

The new generation of ISDN premises sets will include two essential requirements for wide user acceptance. First, they must accommodate new network signaling services with non-voice functionality; that is, facsimile, video, data and imaging. Second, they must ensure the continuity of existing voice telephone service while the data function is provided in a non-intrusive way.

ISDN electronic key premises sets provide a BRI, and have memory storage and alphanumeric display for calling name and number display, and a data terminal interface for RS232C or V.35 non-ISDN terminal connections.

When configured to provide an integrated data terminal interface, the premises set becomes part of a multiservice configuration of up to eight different physical devices, some of which may be asynchronous or bisynchronous non-ISDN terminals using terminal adapters to adapt to the ISDN switch. This type of personal communications over twisted pair makes the concept of a personalized communications center (PCC) possible.

The ISDN PCC concept offers enormous potential for direct handling of all types of information streams via ISDN technology without interference from traditional MIS/telecommunications departments. Incoming call applications such as telemarketing, service orders, catalog sales, wholesale distribution and reservations will have a totally different architecture once database information regarding the virtual application can be linked to the ISDN PCC, or vice versa.

ISDN PCCs will evolve to provide additional functionality that is unavailable on PCs, PBXs, key systems and POTS phones and will appeal to medium-sized and fast-growing businesses. These include additional call appearances, display information, calling number identification services and multimedia capabilities such as windowing of personalized graphics, video, imaging and data on one high-definition color screen.

AT&T, Northern Telecom, Siemens, Ericsson, Eagle Telephone, Fujitsu, NEC, Telrad and Panasonic all provide ISDN premises sets.

Standard ISDN CPE interfaces will result in a wide selection of terminal and systems products available to the customer, potentially at a lower cost. Also, with standard interfaces, terminal portability between building and facility locations will be easier, whether it is from a common user network to an ISDN PBX or from one country to another.

Based on current ISDN installations, it is clear that ISDN must be implemented using switches from only one vendor. At this point the two major CO switch vendors have not yet announced dates for complete multivendor carrier interconnectivity and CPE interworking and portability.

Recently the RHCs have been stressing the need for CPE vendors and switch suppliers to conform to Bellcore's technical requirements, which describe basic call control and signaling features and supplementary services. In spite of telco pressure for specifications compliance, full implementation of the published Bellcore requirements will not occur until 1991.

At this time, interworking and multivendor interconnectivity will give ISDN users end-to-end connectivity in the major regions. Full end-to-end ISDN ubiquity may be elusive since there are over 250 Independent telcos with less than 1000 subscribers.

Future ISDN CPE

The emerging intelligent network services are changing future ISDN CPE functionality expectations and the type of applications that can reside within the ISDN CPE. What characterizes the intelligent network-coupled ISDN CPE is not widely recognized.

From the ISDN CPE side, circuit and packet switching capability, D-channel functionality, desk-to-desk digital connectivity for voice and data, integrated access to carrier services and several other vistas already have been described. It is not clear at this time whether the intelligent network infrastructure will complement, or be competitive with, intelligent ISDN PCC (CPE) networking. Only time will tell.

The evolution of the PC, the ISDN PC terminal adapter and the ISDN PCC can potentially create thousands of applications that can take advantage of the ubiquitous network intelligence provided by ISDN. Some of the possible multimedia service offerings that might be tariffed by telcos soon include message services, calling number display, message waiting, leave word calling, videoconferencing, reservation services, facsimile distribution, call management, compression, desktop conferencing security and voice encryption.

But if all devices, services, or applications running on an ISDN bus are not push-button friendly, the low-priced PCC concept will not capture the small and medium-sized businesses or home consumers in the same way that word processing and spreadsheets have. ■

William C. Kanupke is President of Kanupke Associates, Haddonfield, N.J.